

This Page Is Inserted by IFW Operations  
and is not a part of the Official Record

## **BEST AVAILABLE IMAGES**

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images may include (but are not limited to):

- BLACK BORDERS
- TEXT CUT OFF AT TOP, BOTTOM OR SIDES
- FADED TEXT
- ILLEGIBLE TEXT
- SKEWED/SLANTED IMAGES
- COLORED PHOTOS
- BLACK OR VERY BLACK AND WHITE DARK PHOTOS
- GRAY SCALE DOCUMENTS

**IMAGES ARE BEST AVAILABLE COPY.**

**As rescanning documents *will not* correct images,  
please do not report the images to the  
Image Problem Mailbox.**

PCT

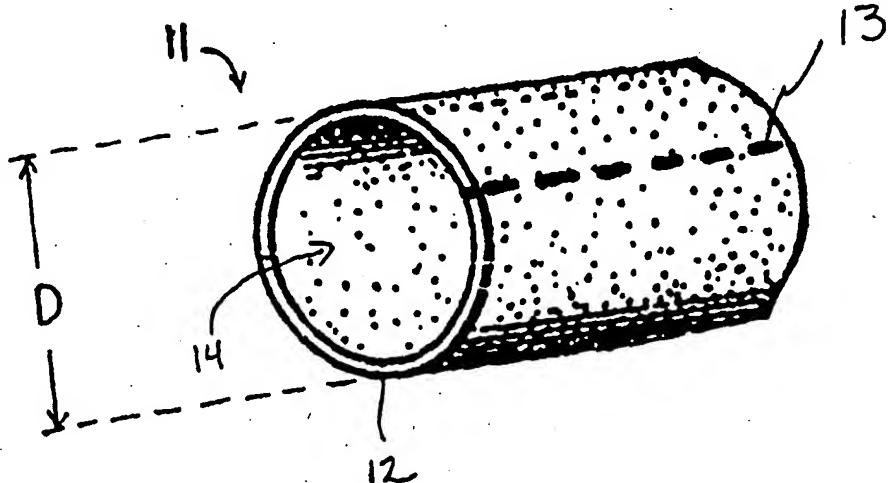
WORLD INTELLECTUAL PROPERTY ORGANIZATION  
International Bureau

CL

## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification <sup>6</sup> :  A61L 27/00, A61K 35/38		A3	(11) International Publication Number: <b>WO 98/22158</b>  (43) International Publication Date: 28 May 1998 (28.05.98)
(21) International Application Number: PCT/US97/14855		(81) Designated States: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, GH, HU, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, UZ, VN, YU, ZW, ARIPO patent (GH, KE, LS, MW, SD, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG).	
(22) International Filing Date: 22 August 1997 (22.08.97)			
(30) Priority Data: 60/024,542 23 August 1996 (23.08.96) US 60/024,693 6 September 1996 (06.09.96) US			
(71) Applicants: COOK BIOTECH, INCORPORATED [US/US]; 3055 Kent Avenue, P.O. Box 2603, West Lafayette, IN 47906 (US). MED INSTITUTE, INCORPORATED [US/US]; 1400 Cumberland Avenue, West Lafayette, IN 47906 (US).		Published <i>With international search report.</i>	
(72) Inventors: COOK, William, A.; 1208 Wylie Street, Bloomington, IN 47401 (US). HILES, Michael, C.; 4326 South 900 East, Lafayette, IN 47905 (US). KOZMA, Thomas, G.; Apartment 2C, 3118 Courthouse Drive, West Lafayette, IN 47906 (US). PATEL, Umesh, H.; 1135 Kingswood Road South, West Lafayette, IN 47906 (US).		(88) Date of publication of the international search report: 22 October 1998 (22.10.98)	
(74) Agent: GODLEWSKI, Richard, J.; P.O. Box 2256, West Lafayette, IN 47906 (US).			

## (54) Title: GRAFT PROSTHESIS, MATERIALS AND METHODS



## (57) Abstract

A graft prosthesis (11), materials and method for implanting, transplanting, replacing, or repairing a part of a patient. The graft prosthesis includes a purified, collagen-based matrix structure removed from a submucosa tissue source. The submucosa tissue source is purified by disinfection and removal steps to deactivate and remove contaminants, thereby making the purified structure biocompatible and suitable for grafting on and/or in a patient.

**FOR THE PURPOSES OF INFORMATION ONLY**

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AL	Albania	ES	Spain	LS	Lesotho	SI	Slovenia
AM	Armenia	FI	Finland	LT	Lithuania	SK	Slovakia
AT	Austria	FR	France	LU	Luxembourg	SN	Senegal
AU	Australia	GA	Gabon	LV	Latvia	SZ	Swaziland
AZ	Azerbaijan	GB	United Kingdom	MC	Monaco	TD	Chad
BA	Bosnia and Herzegovina	GE	Georgia	MD	Republic of Moldova	TG	Togo
BB	Barbados	GH	Ghana	MG	Madagascar	TJ	Tajikistan
BE	Belgium	GN	Guinea	MK	The former Yugoslav Republic of Macedonia	TM	Turkmenistan
BF	Burkina Faso	GR	Greece	ML	Mali	TR	Turkey
BG	Bulgaria	HU	Hungary	MN	Mongolia	TT	Trinidad and Tobago
BJ	Benin	IE	Ireland	MR	Mauritania	UA	Ukraine
BR	Brazil	IL	Israel	MW	Malawi	UG	Uganda
BY	Belarus	IS	Iceland	MX	Mexico	US	United States of America
CA	Canada	IT	Italy	NE	Niger	UZ	Uzbekistan
CF	Central African Republic	JP	Japan	NL	Netherlands	VN	Viet Nam
CG	Congo	KE	Kenya	NO	Norway	YU	Yugoslavia
CH	Switzerland	KG	Kyrgyzstan	NZ	New Zealand	ZW	Zimbabwe
CI	Côte d'Ivoire	KP	Democratic People's Republic of Korea	PL	Poland		
CM	Cameroon	KR	Republic of Korea	PT	Portugal		
CN	China	KZ	Kazakhstan	RO	Romania		
CU	Cuba	LC	Saint Lucia	RU	Russian Federation		
CZ	Czech Republic	LI	Liechtenstein	SD	Sudan		
DE	Germany	LK	Sri Lanka	SE	Sweden		
DK	Denmark	LR	Liberia	SG	Singapore		
EE	Estonia						

# INTERNATIONAL SEARCH REPORT

International Application No  
PCT/US 97/14855

**A. CLASSIFICATION OF SUBJECT MATTER**  
IPC 6 A61L27/00 A61K35/38

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)  
IPC 6 A61L A61K

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 480 424 A (COX JAMES L) 2 January 1996  see the whole document	1,20, 27-40, 44-54, 62-64
X	WO 96 25179 A (BONADIO JEFFREY ;PURDUE RESEARCH FOUNDATION (US)) 22 August 1996 cited in the application  see claims	1,20, 27-40, 44-54, 62-64
X	US 5 275 826 A (BADYLAK STEPHEN F ET AL) 4 January 1994 cited in the application  see claims; examples	1,20, 27-40, 44-54, 62-64
		-/-

Further documents are listed in the continuation of box C.

Patent family members are listed in annex.

\* Special categories of cited documents :

- "A" document defining the general state of the art which is not considered to be of particular relevance
- "E" earlier document but published on or after the international filing date
- "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"S" document member of the same patent family

Date of the actual completion of the international search

Date of mailing of the international search report

16 July 1998

20/08/1998

Name and mailing address of the ISA  
European Patent Office, P.B. 5818 Patentlaan 2  
NL - 2280 HV Rijswijk  
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl.  
Fax: (+31-70) 340-3016

1 Authorized officer

ESPINOSA, M

## INTERNATIONAL SEARCH REPORT

International Application No  
PCT/US 97/14855

## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 93 05798 A (PURDUE RESEARCH FOUNDATION) 1 April 1993  see claims & US 5 372 821 A cited in the application ---	1,20, 27-40, 44-54, 62-64
X	WO 90 00395 A (PURDUE RESEARCH FOUNDATION) 25 January 1990  see claims & US 4 956 178 A cited in the application ---	1,20, 27-40, 44-54, 62-64
X	HODDE J P ET AL: "GLUCOSAMINOGLYCAN CONTENT OF SMALL INTESTINAL SUBMUCOSA: A BIOSCAFFOLD FOR TISSUE REPLACEMENT" TISSUE ENGINEERING, vol. 2, no. 3, 1996, pages 209-217, XP002063373 see the whole document ---	1,20, 27-40, 44-54, 62-64
X	S.F. BADYLAK ET AL.: "THE USE OF XENOGENIC SMALL INTESTINAL SUBMUCOSA AS A BIOMATERIAL FOR ACHILLE'S TENDON REPAIR IN A DOG MODEL" JOURNAL OF BIOMEDICAL MATERIALS RESEARCH, vol. 29, no. 8, 1995, pages 977-985, XP002071882 see abstract ---	1,20
X	M.A. COBB ET AL.: "HISTOLOGY AFTER DURAL GRAFTING WITH SMALL INTESTINAL SUBMUCOSA" SURGICAL NEUROLOGY, vol. 46, no. 4, 1996, pages 389-394, XP002071883 see the whole document ---	1,20
X	J.D. VAUGHT ET AL. : "DETRUSOR REGENERATION IN THE RAT USING PORCINE SMALL INTESTINAL SUBMUCOSAL GRAFTS: FUNCTIONAL INNERVATION AND RECEPTOR EXPRESSION" THE JOURNAL OF UROLOGY, vol. 155, no. 1, 1996, pages 374-378, XP002071884 see abstract ---	1,20
1	P,X WO 96 31157 A (ORGANOGENESIS INC ;TERMIN PAUL L (US); CARR ROBERT M JR (US); COND 10 October 1996  see claims; examples ---	1,20, 27-40, 44-54, 62-64

**INTERNATIONAL SEARCH REPORT**

Information on patent family members

International Application No

PCT/US 97/14855

Patent document cited in search report	Publication date	Patent family member(s)		Publication date
US 5480424	A 02-01-1996	WO 9724082 A		10-07-1997
		WO 9724083 A		10-07-1997
		US 5713950 A		03-02-1998
		AU 4688596 A		28-07-1997
WO 9625179	A 22-08-1996	AU 5296596 A		04-09-1996
US 5275826	A 04-01-1994	AU 677974 B		15-05-1997
		AU 5552394 A		08-06-1994
		CA 2149324 A		26-05-1994
		CZ 9501240 A		15-11-1995
		EP 0671922 A		20-09-1995
		FI 952337 A		12-05-1995
		HU 73965 A		28-10-1996
		JP 8506799 T		23-07-1996
		MX 9307046 A		31-01-1995
		NO 951881 A		12-05-1995
		NZ 258032 A		26-05-1997
		PL 309000 A		18-09-1995
		SK 61095 A		08-11-1995
		WO 9411008 A		26-05-1994
		US 5516533 A		14-05-1996
		US 5641518 A		24-06-1997
WO 9305798	A 01-04-1993	US 5281422 A		25-01-1994
		AU 668520 B		09-05-1996
		AU 2651192 A		27-04-1993
		CA 2119750 A		01-04-1993
		EP 0605581 A		13-07-1994
		JP 6510927 T		08-12-1994
		MX 9205388 A		01-05-1993
		NZ 244475 A		26-05-1995
		US 5445833 A		29-08-1995
		US 5372821 A		13-12-1994
		US 5573784 A		12-11-1996
WO 9000395	A 25-01-1990	US 4902508 A		20-02-1990
		AT 112963 T		15-11-1994
		AU 613499 B		01-08-1991
		AU 3709189 A		11-01-1990

# INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/US 97/14855

Patent document cited in search report	Publication date	Patent family member(s)		Publication date
WO 9000395	A	CA	1335432 A	02-05-1995
		CH	681506 A	15-04-1993
		CH	681856 A	15-06-1993
		CN	1039352 A, B	07-02-1990
		DE	68918943 D	24-11-1994
		DE	68918943 T	08-06-1995
		DK	340589 A	12-01-1990
		EP	0424463 A	02-05-1991
		IE	67279 B	20-03-1996
		IL	90622 A	24-06-1994
		JP	2539934 B	02-10-1996
		JP	4501516 T	19-03-1992
		MX	171671 B	10-11-1993
		OA	9633 A	30-04-1993
		PH	26921 A	03-12-1992
		PT	91096 A, B	08-02-1990
		RU	2037317 C	19-06-1995
		US	4956178 A	11-09-1990
WO 9631157	A	10-10-1996	US	5733337 A
			AU	5308396 A
			EP	0828453 A